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**Sarkar**

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(54) **CONGESTION CONTROL IN A WIRELESS DATA NETWORK**

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 105 days.

This patent is subject to a terminal disclaimer.

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**H04W 4/00** (2009.01)

(52) **U.S. Cl.**  
USPC ..... **370/331**

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See application file for complete search history.

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(57) **ABSTRACT**

Techniques for congestion control are disclosed. In an embodiment, a base station allocates a shared resource using a combination of zero or more individual grants and zero or more common grants, and generates a multi-valued busy signal in response to loading conditions that exceed a predetermined level. In another embodiment, a subset of transmitting mobile stations reduce their transmission rate in response to a multi-valued busy signal. The subset may include autonomous transmission, commonly granted transmission, individually granted transmission, or any combination thereof. In various embodiments, rate adjustment may be probabilistic or deterministic. In an embodiment, a rate table is deployed, and a mobile station decreases or increases the transmission rate from one rate in the table to a lower or higher rate in the table, respectively, in response to the busy signal. Various other aspects provide efficient congestion control, avoiding excessive interference and increasing capacity.

**48 Claims, 10 Drawing Sheets**

